

What is claimed is:

1. A solid-state chemical vapor generator system, which comprises:
  - 5    a) a chemical adsorption apparatus comprising a temperature controlled housing having an outer shell defining an interior chamber; a vapor inlet disposed through a first end of the housing; a vapor outlet disposed through a second end of the housing; and an adsorption article which comprises a chemical adsorbate material disposed on a solid adsorbent material, which adsorption article is contained within a gas impermeable container within the interior chamber of the housing, which container is attached to the vapor inlet and vapor outlet, and which adsorption article is capable of releasing controlled amounts of chemical adsorbate material vapor into the gas impermeable container;
  - 10    b) an inert gas source connected to the vapor inlet via a vapor inlet tube, which gas source is capable of supplying a predetermined amount of inert gas into the interior chamber of the housing and into the gas impermeable container, via the vapor inlet; and
  - 15    c) a vapor outlet tube connected to the vapor outlet, through which vapor outlet tube the chemical adsorption apparatus is capable of releasing a predetermined amount of chemical vapor, together with a predetermined amount of inert gas, from the gas impermeable container and out of the housing.
- 2    The chemical vapor generator system of claim 1, further comprising a chemical vapor detector connected to the chemical adsorption apparatus via the vapor outlet tube.

3. The chemical vapor generator system of claim 2, wherein said chemical vapor detector is connected to the vapor outlet tube via a sampling line attached to the chemical vapor detector.
- 5      4. The chemical vapor generator system of claim 1, wherein said chemical adsorbate material has a vapor pressure of above about 0.01 Pa at about 25<sup>0</sup>C.
- 10     5. The chemical vapor generator system of claim 1, wherein the chemical adsorbate material is selected from the group consisting of chemical warfare agents, toxic industrial chemicals, narcotics, and explosives.
- 15     6. The chemical vapor generator system of claim 1, wherein the chemical adsorbate material is selected from the group consisting of HD, GA, GB, GD, GF, and VX nerve agents; toxic industrial chemicals comprising chlorinated dioxins and furans; PCP and LSD narcotics; and DNT and TNT explosives.
- 20     7. The chemical vapor generator system of claim 1, wherein the solid adsorbent material is selected from the group consisting of activated synthetic and non-synthetic carbons, silicas, aluminas, and combinations thereof.
- 25     8. The chemical vapor generator system of claim 1, wherein the solid adsorbent material comprises a micro-porous material.
9. The chemical vapor generator system of claim 1, wherein the inert gas is selected from the group consisting of helium, hydrogen, nitrogen, neon, argon, krypton, xenon, radon, and combinations thereof.

10. The chemical vapor generator system of claim 1, wherein the chemical adsorption apparatus further comprises at least one additional gas impermeable container packed with an additional adsorption article, wherein the additional adsorption article comprises a different chemical adsorbate and/or adsorbent  
5 material than the first container.

11. A method for generating a chemical vapor gas stream, which comprises:

(i) providing a chemical vapor generation system, which comprises:

10 (a) a chemical adsorption apparatus comprising a temperature controlled housing having an outer shell defining an interior chamber; a vapor inlet disposed through a first end of the housing; a vapor outlet disposed through a second end of the housing; and an adsorption article which comprises a chemical adsorbate material disposed on a solid adsorbent material, which adsorption article is contained within a gas impermeable container within the interior chamber of the housing, which container is attached to the vapor inlet and vapor outlet, and which adsorption article is capable of releasing controlled amounts of chemical adsorbate material vapor into the gas impermeable container;

15 (b) an inert gas source attached to the vapor inlet via a vapor inlet tube, which gas source is capable of supplying a predetermined amount of inert gas into the interior chamber of the housing via the vapor inlet; and

20 (c) a vapor outlet tube attached to the vapor outlet, through which vapor outlet tube the chemical adsorption apparatus is capable of releasing a predetermined amount of chemical adsorbate material vapor, together with a predetermined amount of inert gas, from the gas impermeable container and out of the housing; and

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(ii) supplying a predetermined amount of inert gas from the inert gas source into the gas impermeable container, wherein a predetermined amount of chemical

adsorbate material vapor is released, together with a predetermined amount of inert gas, from the gas impermeable container and out of the housing, via the vapor outlet tube.

- 5      12. The method of claim 11, wherein the chemical adsorption system further comprises a chemical vapor detector connected to the chemical adsorption apparatus via the vapor outlet tube.
- 10     13. The method of claim 12, wherein said chemical vapor detector is connected to the vapor outlet tube via a sampling line attached to the chemical vapor detector.
14. The method of claim 11, wherein said chemical adsorbate material has a vapor pressure of above about 0.01 Pa at about 25°C.
- 15     15. The method of claim 11, wherein the chemical adsorbate material is selected from the group consisting of chemical warfare agents, toxic industrial chemicals, narcotics, and explosives.
- 20     16. The method of claim 11, wherein the chemical adsorbate material is selected from the group consisting of HD, GA, GB, GD, GF, and VX nerve agents; toxic industrial chemicals comprising chlorinated dioxins and furans; PCP and LSD narcotics; and DNT and TNT explosives.
- 25     17. The method of claim 11, wherein the solid adsorbent material is selected from the group consisting of activated synthetic and non-synthetic carbons, silicas, aluminas, and combinations thereof.

18. The method of claim 11, wherein the solid adsorbent material comprises a micro-porous material.

19. The method of claim 11, wherein the inert gas is selected from the group consisting of helium, hydrogen, nitrogen, neon, argon, krypton, xenon, radon, and combinations thereof.

20. The method of claim 11, wherein the chemical adsorption apparatus further comprises at least one additional gas impermeable container packed with an additional adsorption article, wherein the additional adsorption article comprises a different chemical adsorbate and/or adsorbent material than the first container.

21. A chemical vapor generating apparatus which comprises a temperature controlled housing having an outer shell defining an interior chamber; a vapor inlet disposed through a first end of the housing; a vapor outlet disposed through a second end of the housing; and an adsorption article which comprises a chemical adsorbate material disposed on a solid adsorbent material, which adsorption article is contained within a gas impermeable container within the interior chamber of the housing, which container is attached to the vapor inlet and vapor outlet, and which adsorption article is capable of releasing controlled amounts of chemical adsorbate material vapor into the gas impermeable container.

22. The apparatus of claim 21, wherein said chemical adsorbate material has a vapor pressure of above about 0.01 Pa at about 25 C.

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23. The apparatus of claim 21, wherein the chemical adsorbate material is selected from the group consisting of chemical warfare agents, toxic industrial chemicals, narcotics, and explosives.

24. The apparatus of claim 21, wherein the chemical adsorbate material is selected from the group consisting of HD, GA, GB, GD, GF, and VX nerve agents; toxic industrial chemicals comprising chlorinated dioxins and furans; PCP and LSD narcotics; DNT and TNT explosives, and combinations thereof.

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25. The apparatus of claim 21, wherein the solid adsorbent material is selected from the group consisting of activated synthetic and non-synthetic carbons, silicas, aluminas, and combinations thereof.

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26. The apparatus of claim 21, wherein the solid adsorbent material comprises a micro-porous material.

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27. The apparatus of claim 21, wherein the chemical adsorption apparatus further comprises at least one additional gas impermeable container packed with an additional adsorption article, wherein the additional adsorption article comprises a different chemical adsorbate and/or adsorbent material than the first container.

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28. The apparatus of claim 21, wherein the inert gas is selected from the group consisting of helium, hydrogen, nitrogen, neon, argon, krypton, xenon, radon, and combinations thereof.